



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

| APPLICATION NO.           | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---------------------------|-------------|----------------------|---------------------|------------------|
| 10/551,471                | 09/30/2005  | Thomas Hanemann      | 31775-221177        | 4402             |
| 26694                     | 7590        | 11/27/2007           | EXAMINER            |                  |
| VENABLE LLP               |             |                      | REDDY, KARUNA P     |                  |
| P.O. BOX 34385            |             |                      |                     |                  |
| WASHINGTON, DC 20043-9998 |             |                      | ART UNIT            | PAPER NUMBER     |
|                           |             |                      | 1796                |                  |
|                           |             |                      | MAIL DATE           | DELIVERY MODE    |
|                           |             |                      | 11/27/2007          | PAPER            |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                 |                 |
|------------------------------|-----------------|-----------------|
| <b>Office Action Summary</b> | Application No. | Applicant(s)    |
|                              | 10/551,471      | HANEMANN ET AL. |
|                              | Examiner        | Art Unit        |
|                              | Karuna P. Reddy | 1796            |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 14 September 2007.  
 2a) This action is FINAL.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1-8 and 10-20 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-5, 8, 10, 11 and 14-17 is/are rejected.  
 7) Claim(s) 5-7, 12-13 and 17-20 is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

|  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

**DETAILED ACTION**

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/14/2007 has been entered.
2. Amendment filed on 9/14/2007 is made of record. Applicant's amended claims 1 and 5-7; cancelled claim 9; and added claims 15-20. Claims 1-8 and 10-20 are currently pending in the application.
3. Text of those sections of Title 35 U.S. Code not included in this office action can be found in the prior office action.

***Claim Objections***

4. Claims 5-7 and 17-20 are objected to because of the following informalities: The recitation of "benzanthrazene" (claim 5, line 4); 1,7-phenanthroline (claim 6, line 4; claim 18, line 3; claim 19, line 3); 1,2-benzoxazole (claim 7, line 3; claim 18, line 4; claim 19, line 3; claim 20, line 3); 1,7-phenanthroline (claim 20, line 3);

benzofurane (claim 7, line 3; claim 18, line 4; claim 19, line 3; claim 20, line 3); and "2, 3-benzanthracene" is incorrect and should read "benzanthracene", "1,7-phenanthroline", 1,2-benzoxazole", "1,7-phenanthroline", "benzofuran" and "2,3-benzanthracene" respectively. Appropriate correction to the typographical error is required.

***Claim Rejections - 35 USC § 102***

5. Claims 1-4, 10 and 15-16 (new) are rejected under 35 U.S.C. 102(e) as being anticipated by Fujiyama et al (US 2003/0085387 A1).

The rejection is adequately set forth in paragraph 4 of office action mailed 5/17/2007 and is incorporated here by reference.

6. Claims 1-4, 10 and 15-16 (new) are rejected under 35 U.S.C. 102(a) as being anticipated by Heyning et al (US 2003/0161605 A1).

The rejection is adequately set forth in paragraph 5 of office action mailed 5/17/2007 and is incorporated here by reference.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. Claims 1-5, 8, 10-11 and 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ducharme et al (5, 064, 264) in view of Chemla et al (Nonlinear Optical Properties of Organic Molecules and Crystals, Academic Press 1987).

Ducharme et al disclose polymeric materials that exhibit an erasable photorefractive effect which can be fabricated into optical devices such as optical wave guides (abstract). The present invention relates to an amorphous or substantially amorphous erasable photorefractive material comprising a polymer and a non-linear optical chromophore (column 2, lines 24-28). One major role of the polymer is to function as a binder (column 2, lines 34-36). The non-linear optical chromophore can be dispersed in the polymer binder as a guest/host material (column 2, lines 47-49). Suitable polymers in the present invention include polyacrylates (column 2, lines 51-56).

Ducharme et al is silent with respect to condensed aromatic ring systems. However, Ducharme teaches that suitable chromophores for use will be known to those skilled in the art such as those disclosed in "Nonlinear Optical Properties of Organic Molecules and Crystals" by Chemla and Zyss, Academic Press 1987 (column 7, lines 14-18). Examples listed in Chemla et al include polynuclear aromatics such as 1,2-Benzanthracene (table IV, page 245, line 15). Therefore, it would have been obvious to use organic molecular crystals i.e. 1, 2-benzanthracene of Chemla et al as chromophore in the photorefractive material of Ducharme et al, which can be fabricated into an optical waveguide.

With respect to 2,3-benzanthracene of claim 8, it is held by court that structural similarities have been found to support a *prima facie* case of obviousness and 2,3-benzanthracene is a structural isomer of 1,2-benzanthracene. See *In re Wilder*, 563 F.2d 457, 460, 195 USPQ 426, 429 (CCPA 1977).

10. Claims 8 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ducharme et al (5, 064, 264) in view of Chemla et al (Nonlinear Optical Properties of Organic Molecules and Crystals, Academic Press 1987) and Gott (J. Phys. B: Atom. Molec. Phys., 1971, Vol. 4)

The discussion with respect to Ducharme et al in view of Chemla et al in paragraph 9 above is incorporated here by reference.

However, Ducharme et al in view of Chemla et al is silent with respect to organic ring systems phenanthrene and anthracene.

However, Chemla et al teach that primary references should be further consulted for additional examples (page 221, lines 6-9). The primary reference of Gott cited in Chemla et al teaches optical second-harmonic generation coefficients of several organic molecular crystals (abstract). A correlation between structural effects and non-linear optical properties is found in a number of aromatic molecular crystals, in that a polarizable benzene nucleus is present in each molecule (page 116, lines 16-19). See table 1 for a listing of organic molecular crystals, that include phenanthrene, 1, 2-benzanthracene and anthracene, all of which have a non-linear coefficient greater than 0. Therefore, it would have been obvious to use organic molecular crystals i.e. phenanthrene, anthracene of Gott as chromophore in the photorefractive material of Ducharme et al in view of Chemla et al, which can be fabricated into an optical waveguide.

***Allowable Subject Matter***

11. Claims 6-7, 12-13 and 18-20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

It is noted that claims 6-7, 12-13 and 18-20 recite use of aromatic ring systems benzoquinoline, 1,10-phenanthroline, phenanthridine, 1,7-

phenanthroline, benzofuran and 1,2-benzoxazole in an optical waveguide. The closest prior art, viz., Fujiyama et al (US 2003/0085387 A1), Heyningen et al (US 2003/0161605 A1), Ducharme et al (5, 064, 264), Chemla et al (Nonlinear Optical Properties of Organic Molecules and Crystals, Academic Press 1987) and Gott (J. Phys. B: Atom. Molec. Phys., 1971, Vol. 4), taken individually or in combination, does not disclose or suggest aromatic ring systems benzoquinoline, 1,10-phenanthroline, phenanthridine, 1,7-phenanthroline, benzofuran and 1,2-benzoxazole. Thus Fujiyama et al and Heyningen et al disclose aromatic fused ring systems as part of larger molecules, Ducharme et al discloses chromophores that have unsymmetrical, polarized, conjugated  $\pi$  electrons between a donor and acceptor group, Chemla et al discloses 1,2-benzanthracene and Gott discloses anthracene, 1,2-benzanthracene and phenanthrene, all of which do not include benzoquinoline, 1,10-phenanthroline, phenanthridine, 1,7-phenanthroline, benzofuran and 1,2-benzoxazole as the aromatic ring system.

In view of the above discussion, objection to claims 6-7, 12-13 and 18-20 will be overcome, if rewritten in independent form including all of the limitations of base claim and any intervening claims.

***Response to Arguments***

12. Applicant's arguments filed 9/14/2007 in response to rejection of claims 1-4 and 10 under 35 U.S.C. 102(e) as being anticipated by Fujiyama et al (US 2003/0085387 A1); and claims 1-4 and 10 under 35 U.S.C. 102(a) as being anticipated by Heyning et al (US 2003/0161605 A1), have been fully considered but they are not persuasive. Specifically, applicant argues that (A) optical materials of Fujiyama et al are all aromatic sulfides which comprise condensed aromatic ring systems; and (B) electro-optical compound of Heyning et al always influences hyperpolarizability ( $\beta$ ,  $\gamma$ ) of the material, while all compounds of present claims can only influence the linear polarizability and hyperpolarizability is influenced by employing optically active chiral polymers.

With respect to (A), it is the examiner's position that aromatic sulfide A-(S- $B^k$ )<sub>n</sub> of Fujiyama et al meets the claim limitation of an "organic compound selected from the group consisting of a condensed aromatic ring system" of claims 1-4, because A and B of aromatic sulfides are indeed carbocyclic or heterocyclic aromatic rings (abstract) composed of 2 to 4 aromatic rings fused together (paragraphs 0065, 0079) exemplified by phenanthrene (paragraph 0081) and benzoxazole (paragraph 0072).

With respect to (B), it is noted that the features upon which applicant relies (i.e., electro-optical compound of Heyning et al always influences hyperpolarizability ( $\beta$ ,  $\gamma$ ) of the material, while all compounds of present claims can only influence the linear polarizability) are recited neither in the claims nor

referred to in the specification, and therefore cannot provide the basis for patentability of present claims.

13. Applicant's arguments, see page 7, line 3, filed 9/14/2007, with respect to the rejection(s) of claim(s) 5, 7-8, 11 and 13-14 under 35 U.S.C. 102(e) as being anticipated by Fujiyama et al (US 2003/0085387 A1); and claims 6 and 12 under 35 U.S.C. 102(a) as being anticipated by Heyning et al (US 2003/0161605 A1), have been fully considered and are persuasive in light of the amendment, of these claims, to incorporate "selected from the group consisting of". Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karuna P. Reddy whose telephone number is (571) 272-6566.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on (571) 272-1119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Karuna P Reddy  
Examiner  
Art Unit 1796

/KR/

/Vasu Jagannathan/  
Supervisory Patent Examiner  
Technology Center 1700